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Dawning of percussive massage therapy combined with other interventions for a patient with lumbo-sacral transitional vertebrae: A case report

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ABSTRACT

Sacralization is the inclusion of sacral components caused by the merging of the 5th lumbar or 1st coccygeal vertebrae, or both. The fifth lumbar vertebra could fuse with the sacrum unilaterally or bilaterally, resulting in partial or total sacralization. It is linked to low back pain, bulging of disc or herniated one, Neck rib, and Bertolotti's syndrome. Backpain is the most prevalent adult health problem that causes discomfort and impairment, whereas Radiculopathy causes low back pain that radiates to the lower extremities. The purpose of this case study is to develop a thorough physical therapy plan for a patient who suffers from persistent low back pain and Prolapsed Intervertebral Disc. The patient was a 54-year-old male with a 2-year history of LBP. The pain further radiated to left leg. His MRI revealed degenerative abnormalities in the lumbar spine and annular tear at the L2-L3, L3-L4 disc level. The patient's major issue about his ailment was that he couldn't work without pain, and that the pain was interfering with his sleep. The pain level on the NPRS has decreased from 8/10 to 2/10 after 4 weeks. The patient reported that intolerable pain has been lessened. The ability to function has been returned, as has the ability to sleep. Percussive Massage therapy, electrical stimulation, tailored patient education, manual methods, superficial heat, and a home exercise regimen were all part of a complete physical therapy program.

Keywords: Lumbar spine, Low back pain, PIVD, Radiculopathy, Percussive massage, Theragun

1. INTRODUCTION

The sacrum is a massive, triangle-shaped, solitary bone that forms the dorsal boundary of the pelvis and is wedged between two hip bones. Fusion of 5 Sacral vertebral bodies takes place for production of a sacrum with a concave groove in the anterior establishing the pelvic surface and a convexity in the

posterior producing the dorsal region. The symphysis joint and lumbosacral angle are formed by the articulation of the lower border of the fifth Lumbar bone with the top surface of the sacrum (Sabnis and Nakhate, 2020). Sacralization is the union of the fifth lumbar vertebral body with the first five sacral vertebrae. During development, there occurs a change in the lumbosacral spine segments where the transverse process of the 5th lumbar vertebra combines with the sacrum or iliac bone (Dharati et al., 2012).

The architecture of the lumbar and sacral vertebrae changes, resulting in alterations in the lumbosacral angle in sacralization and, eventually, greater stress on the L4-L5 section, which is moving, resulting in additional degenerative changes in the facet joint, disc, and spondylolysis of L4 on L5 (Lee and Langrana, 1984). All of this leads to altered biomechanics and is the basis of backache. To limit the possibility of mistakes in spinal surgical procedures, the concept Sacralization should be taken into consideration for the best possible result. Bertolotti discovered lumbar-sacral transitional vertebrae (LSTV), which are frequent developmental defects that include lumbarization and sacralization (McGrath et al., 2022). The lengthening of the transverse process characterises Stage I. The second stage is distinguished by a diarthrodial joint in which TP connects with the sacrum but is not united. Unification of the transverse process and the sacrum occurs in stage III. When one side is in stage II and the other is in stage III, the stage IV condition develops. LBP is the most prevalent cause for getting medical help; it affects 80 percent of individuals at certain point in their lives. Treatment begins with a thorough assessment (Manmohan et al., 2015).

Muscle tension may be related to postural problems. Both can have a role in a variety of musculoskeletal diseases. Reduced hamstring extensibility may be a contributing cause to low back problems. These are of major therapeutic importance in eradication of LBP, particularly because tight hamstrings may have an indirect role in the development of condition as these are supposed to pull the pelvis into posterior rotation (Jandre Reis and Macedo, 2015). Physical therapy is a non-invasive treatment that emphasises fitness and pain management. Percussive massage combines the benefits of both traditional massage and vibration therapy. In the realm of rehabilitation and sports, the use of vibrating devices to enhance elongation and reduce stiffness of muscle tissue has grown in recent years (Jung and Ha, 2020).

2. PATIENT'S INFORMATION

A 54-year-old male came to see us in April 2022 with a 5-year history of lower back pain that had been episodic before but had become much worse in the last two years. It was associated to radiculopathy in the left leg. He worked as a tailor for almost ten years and utilized a manual sewing machine that required at least ten hours of sitting in one spot. He subsequently changed careers and began driving, which required him to sit for lengthy periods of time and exhibit jerky motions owing to the enormous distances he had to drive. Patient is a known case of Diabetes Mellitus type 2 on the higher side. He was treated by general practitioners on a regular basis. He couldn't work since his agony was incapacitating. The patient described his LBP as a dull ache that got worse when he sat, stood, or bent forward (when doing tasks) and went away when he rested. The pain in his lower extremities was described as sharp and inconsistent. The patient recognized he couldn't execute his work correctly because of his discomfort, so he sought therapy at AVBRH.

3. CLINICAL FINDINGS

Physical examination revealed: Ectomorphic built with an antalgic gait. Tenderness of Grade 2 noted at left PSIS with the guarding of paravertebral muscles on the same side. Straight leg raising and Lasegue's sign were positive over the left leg, which suggested that the patient was having lumbar radiculopathy. Tightness of Rectus Femoris and Hamstrings found (Left more than Right). No motor and sensory deficits were noted.

Investigations

MRI: Sacralization of L5 lumbar vertebrae seen. At L2-L3, L3-L4: Disc bulge causing indentation on Anterior thecal sac causing narrowing of bilateral neural foramina with L4-L5: Central disc protrusion also Annular tear at L2-L3 and L3-L4 disc level.

X-ray: Loss of Lumbar Lordosis (Fig. 1), Decrease space between L5-S1 and Degenerative changes in the form of osteophytic formation at lower lumbar region (Fig. 2) found.



Figure 1 Loss of Lumbar Lordosis



Figure 2 Osteophytic changes at L5-S1

Therapeutic intervention

The patient attended sessions four days a week for 4 weeks, totaling 16 appointments. These 45-minute to one-hour treatment sessions included percussive massage therapy, strengthening, stretching, electrical stimulation, and a home workout routine. To achieve those results, it needed time to clearly describe the processes of diagnosis and healing. The following is a general overview of the physiotherapy program: Sufficient relaxation from aggravating activities, recommended for 10-14 days; initially, a heated pack was administered together with Theragun for pain management. Dietary management for sweets, as well as the consumption of more proteinaceous foods, was also recommended, along with thorough Diabetologist counselling.

Theragun

The PMT was designed to increase muscular flexibility while also reducing discomfort. To avoid friction between the head of the device and the skin, the patient was placed in a supine position with a pillow underneath (Fig. 3) as well as a prone position (Fig. 4)

with clothes on, and the Theragun was moved from muscle origin to insertion for 10 minutes for the quadriceps femoris and hamstrings, respectively (Lakhwani and Phansopkar, 2021)



Figure 3 PMT over the muscle belly of Rectus Femoris



Figure 4 PMT over the muscle belly of Hamstring

Modalities

A catch was Transcutaneous Electrical Nerve Stimulation Therapy (Fig. 5) combined with moist heat for pain alleviation and patient comfort. It was proven to provide much better subjective and objective pain relief in a study of people with low back pain (Jarzem et al., 2005).



Figure 5 TENS application over back

Manual therapy

Manual therapy includes myofascial release underlying tissues in the lower back and gluteal zone. It aids in the reduction of pain and the improvement of movement. Stretching and mobility exercises were incorporated. Strength activities were performed to improve endurance and alignment. Flexibility techniques such as hip stretching and cat camel stretching have been used to increase the patient's mobility and relieve pain. Progression in tasks was contingent on the patient's potential. Bilateral Knee to Chest exercises; sustained extension, standing extension, pelvic bridging, and pelvic tilting movements are all examples of progress. Home exercise program: In conjunction to the treatments provided during physiotherapy sessions, the patient was taught exercises to begin a (HEP) at home by applying heat. The exercise plan was checked at each visit, and any new exercises were included to guarantee accuracy.

Outcome of treatment

The patient reported significant improvement and symptom reduction throughout the therapy period. At the end of the session, the pain level on the NPRS had decreased from 8/10 at worst to 2/10. The patient stated that the discomfort is lessening. The ability to function has been restored, as has the quality of sleep.

4. DISCUSSION

One of the key causes in the development of lumbar disc herniation (LDH) is sacralization. LDH typically arises above the L5/S1 transition rather than at the transitional vertebra level. According to some research, L5-S1 transitions have different facet anatomy. These changes might be linked to instances of low back discomfort (Dharati et al., 2012). The likelihood for reduced hamstring and decreased quadriceps flexibility were comparable. Although cross-sectional research have shown a correlation between tight hamstrings and low back pain, this is the first follow-up investigation to substantiate the connection (Feldman, 2001). Goniometric measurements were taken in degrees for the quadriceps in prone (quadriceps angle) and the hamstrings (popliteal angle). A smaller angle suggested greater flexibility for both, indicating that the measurement was closer to zero (Feldman, 2001).

The hamstrings, hip flexors, and quadratus lumborum are all major muscles that influence spinal mobility. They can impact both static and dynamic motions of the spine simply by their attachments to the pelvis. Tight hip flexors, for example, cause a flexion moment in the hip and a compensatory extension moment in the spine, resulting in the typical "sway back." A posterior pelvic tilt caused by tight hamstrings can reduce lumbar lordosis and impede forward spinal flexion. Since all muscles that influence the low back should be robust, the combination of strong and tight muscles is the most likely to cause damage. Hip

flexors, on the other hand, are frequently weak and tight, resulting in strain. Strong but functionally extended muscles are ideal. Back sufferers typically struggle to acquire this balance of strength and flexibility (Jandre Reis and Macedo, 2015).

According to Konrad et al., (2020) it's plausible to assume that increases in ROM following percussive massage are related to a decrease in muscle stiffness as well as a decrease in pain sensitivity.

5. CONCLUSION

Handheld percussive massage is a new therapeutic option for therapists. We saw an improvement in range of motion, muscular flexibility, and the patient's responsiveness to a new technique. As a result, we advocate incorporating this current strategy into improving patient health and muscle quality of life.

Abbreviations

LBP: Low Back Pain

PIVD: Prolapsed Intervertebral Disc

NPRS: Numerical Pain Rating Scale

LSTV: lumbar-sacral transitional vertebrae

TP: transverse process

PMT: Percussive Massage Therapy

HEP: home exercise program

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Author Contributions

All authors made best contribution for the concept, assessment, data acquisition, analysis and the interpretation of data.

Informed consent

Proper written and oral consent was taken from the patient included in this case report.

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Conflicts of interest

The authors declare that there are no conflicts of interests.

Data and materials availability

All data associated with this study are present in the paper.

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